MCP361 Industrial Engineering Lab: Assignment 3

Due date: 9:00 AM August 14, 2024

— **Naming convention for files for this assignment is as follows**
   MCP361_Entry#_Assignment3_Problem1.py
   MCP361_Entry#_Assignment3_Problem2.py
   MCP361_Entry#_Assignment3_Problem2.pdf

— **Submit a zip file to Moodle named as follows**
   MCP361_Entry#_Assignment3.zip

Remember the general guidelines for the assignments given at the start of the course.

Q1) Consider the problem from Section 2.3.3 of the Factory Physics book (data given below). Develop a python code to solve this problem using the Wagner-Whitin procedure. Disregard the number of working days in each week for this problem and use the set up and inventory carrying costs from the book (assume constant set up and inventory carrying costs as given in the book). The code must have the following functionalities: take in demand up to given number of periods (i.e., the user should be able to input 6 months, 3 months, 10 months, or 6 weeks, 3 weeks, 10 weeks), take in constant set up and carrying costs, and output both table (like Table 2.4 in the book) and production schedule (e.g., produce 100 units at $t = 1$, 120 at $t = 2$, 0 at $t = 3$, and so on). Therefore, your python code should be able to detect the number of periods of demand entered and modify the calculations accordingly. Your python code should replicate the results from the book in the form of a table like Table 2.4 in the book. **[5 marks]**

Week	Demand in Units
1	20
2	50
3	10
4	50
5	50
6	10
7	20
8	40
9	20
10	30

Q2) A company manufactures a part for which the forecasted demand for 12 months is given below. The set-up time for a production run is 75 minutes, and each set up requires using a tool that wears out at the rate of 0.005 per hour of use. The tool costs ₹2,500 to replace. In addition, each set-up requires 0.4 liters of lubricating oil which costs ₹100/liter. The salary of the operator is ₹50/hour. In order to store parts, the manufacturer has rented a warehouse of 500 sq ft. at ₹2 per sq ft per month. In addition to this rent, the manufacturer has to pay ₹100/month for electricity charges and the same amount for facility maintenance charges. Assume that the amount stored each month is 500 units (regardless of how many units are actually stored).

[3 marks] Disregard the number of working days in each month for this problem and use the set up and inventory carrying costs calculated using the above information (assume constant set up and inventory carrying costs). You **must** reuse the exact same code from the previous problem to solve this problem using the Wagner-Whitin procedure.

Month	Demand in Units
1	100
2	90
3	115
4	120
5	95
6	100
7	90
8	105
9	105
10	100
11	110
12	105

[2 marks] Then create a table like Table 2.4 in the book. Also interpret the solution as done in Section 2.3.4 of the book.